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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/386,734	08/31/1999	THOMAS RITZDORF	SEMT-1-16048	1735

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EXAMINER
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WYSZOMIERSKI, GEORGE P

ART UNIT	PAPER NUMBER
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1742

DATE MAILED: 12/20/2001

25

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 09/386,734		Applicant(s) RITZDORF ET AL.	
	Examiner George P Wyszomierski		Art Unit 1742	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 03 October 2001.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 36-40 and 68-185 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 40 and 117-182 is/are allowed.
- 6) ☒ Claim(s) 36,37,68-116 and 183-185 is/are rejected.
- 7) ☒ Claim(s) 38 and 39 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
     If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
     a) ☐ All    b) ☐ Some \*    c) ☐ None of:  
         1. ☐ Certified copies of the priority documents have been received.  
         2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
         3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
     \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
     a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                    | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____  |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948)                            | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>18,21</u> | 6) <input type="checkbox"/> Other:  |

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1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 77-116 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for certain processes within the scope of these claims, does not reasonably provide enablement for all processes encompassed by the literal language of the claims, i.e. the specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention commensurate in scope with these claims.

Specifically, it is clear from a reading of the specification that the thermal treatment as claimed or the step which involves a temperature gradient is performed for the purpose of creating an effect in the metal which had been previously deposited. For example, this step may result in annealing of the metal (e.g. as in instant claims 36-40, 68-76, or 130-170) or reducing resistivity of the metal and voids therein (as in instant claims 117-129 and 171-182). Therefore, the instant claims which merely recite generating this temperature gradient, without also discussing its effect upon the metal, are not within the scope of the invention.

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 36, 37, and 68-76 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ding et al. (U.S. Patent 6,066,892).

Ding discloses electroplating of metal (e.g. copper) onto a structure containing the seed layer and barrier layers as recited in instant claims 71-76, followed by an annealing step. Ding does not specifically state that the metal will "substantially fill recessed sub-micron structures in the surface of the workpiece" as required by the instant claims. However, both the metal being deposited (copper) and the method of doing so (electrodeposition) are the same in either the prior art or the claimed invention, and therefore one of skill in the art would expect that the effects upon recessed sub-micron structures would likewise be the same in both the prior art and the invention. Further, the Ding process is for the purpose of creating copper metallizations for use in an integrated circuit, and thus one of skill in the art would believe that the discussion therein involves very small (i.e. sub-micron) spacings. Consequently, a prima facie case of obviousness is established between the Ding et al. disclosure and the presently claimed invention.

5. Claims 183-185 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ding et al., alone or in view of the Tomov et al. Journal of Applied Electrochemistry article (reference "AJ" on the PTO-1449 form filed October 2, 2001).

Ding et al discloses electroplating copper upon a surface followed by thermal processing (annealing) same. Ding does not disclose the "robotic transfer device" as claimed, does not specify a temperature gradient as claimed, and does not recite the particular temperatures as recited in the instant claims. These differences are not seen as resulting in a patentable distinction between the prior art and the claimed invention because:

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a) With respect to the "robotic transfer device", the Ding reference is drawn to the production of materials for integrated circuits, and thus one of skill in the art would believe that process to be as heavily automated as possible, e.g. to avoid contamination of the circuits being produced. Also, this limitation denotes largely an apparatus limitation upon a claimed process, and such a limitation does not render an otherwise known process patentable. Compare In re Sweeney (72 USPQ 501).

b) With regard to a temperature gradient, clearly any elevated temperature annealing process (such as that of Ding et al.) involves subjecting the material being annealed to a heat source, and the temperature of a portion of the material nearest to that heat source would be higher than a temperature of a portion further from the heat source. Therefore, to conduct the annealing steps as disclosed in the prior art while creating the claimed temperature gradient would fall within the purview of the prior art.

c) With regard to temperature, Ding column 6, line 39 recites a temperature as set forth in claim 183 and therefore Ding clearly meets this claimed limitation. With respect to the lower temperatures of claims 184-185, the examiner submits that it is well-known that certain metals such as copper undergo annealing at room temperature or close to it, and the Tomov et al. article explores the effects of low temperature annealing upon electrodeposited copper, i.e. upon a material as produced by the same method as that of Ding et al.

Consequently, the disclosure of Ding, together with general knowledge in the art as exemplified by Tomov et al., would have rendered the claimed process obvious to one of ordinary skill in the art.

6. With regard to the remarks which accompanied the amendment filed October 3, 2001, the examiner agrees that the relative filing dates of the references remove the previously cited


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Uzoh patent as a reference against the present application. Some of the instant claims remain rejected for reasons as set forth supra.

7. Claims 117-182 are allowable over the prior art of record. Also, claims 38 and 39 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to George Wyszomierski whose telephone number is (703) 308-2531. The examiner can normally be reached on Monday thru Friday from 8:00 a.m. to 4:30 p.m. Eastern time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King, can be reached on (703) 308-1146. The fax phone number for this Group is (703) 305-7719. The Right fax number for this examiner is (703) 872-9039. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0661.

  
GEORGE WYSZOMIERSKI  
PRIMARY EXAMINER

GPW  
December 17, 2001